

Oral administration of carvacrol/ β -cyclodextrin complex protects against 6-hydroxydopamine-induced dopaminergic denervation

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Abstract

Carvacrol (CARV) presents valuable biological properties such as anti-inflammatory and antioxidant activities. However, pharmacological uses of CARV are largely limited due to disadvantages related to solubility, bioavailability, preparation and storage processes. The complexation of monoterpenes with β -cyclodextrin (β -CD) increases their stability, solubility and oral bioavailability. Here, the protective effect of oral treatment with CARV/ β -CD complex (25 μ g/kg/day) against dopaminergic (DA) denervation induced by unilateral intranigral injection of 6-hydroxydopamine (6-OHDA - 10 μ g per rat) was analyzed, in order to evaluate a putative application in the development of neuroprotective therapies for Parkinson's disease (PD). Pretreatment with CARV/ β -CD for 15 days prevented the loss of DA neurons induced by 6-OHDA in adult Wistar rats. This effect may occur through CARV anti-inflammatory and antioxidant properties, as the pretreatment with CARV/ β -CD inhibited the release of IL-1 β and TNF- α ; besides, CARV prevented the increase of mitochondrial superoxide production induced by 6-OHDA in cultured SH-SY5Y cells. Importantly, hepatotoxicity or alterations in blood cell profile were not observed with oral administration of CARV/ β -CD. Therefore, this study showed a potential pharmacological application of CARV/ β -CD in PD using a non-invasive route of drug delivery, i.e., oral administration.

Keywords:

Carvacrol, β -cyclodextrin, 6-hydroxydopamine, Parkinson's disease